



## MPC55xx/MPC56xx NEXUS Debugger and Trace

- Support for NEXUS standard class 1 to 3+
- Easy high-level and assembler debugging
- Program flow and Data trace
- Watchpoint and Ownership tracing
- Up to 4 GByte trace memory
- Trigger programming
- Interface to all hosts
- USB and ETHERNET interface included
- Support for VLE (Variable Length Encoding)
- eTPU, GTM and SPT debuggers included
- eTPU program and data trace supported
- Data trace for additional trace clients (e.g. DMA, FlexRay)

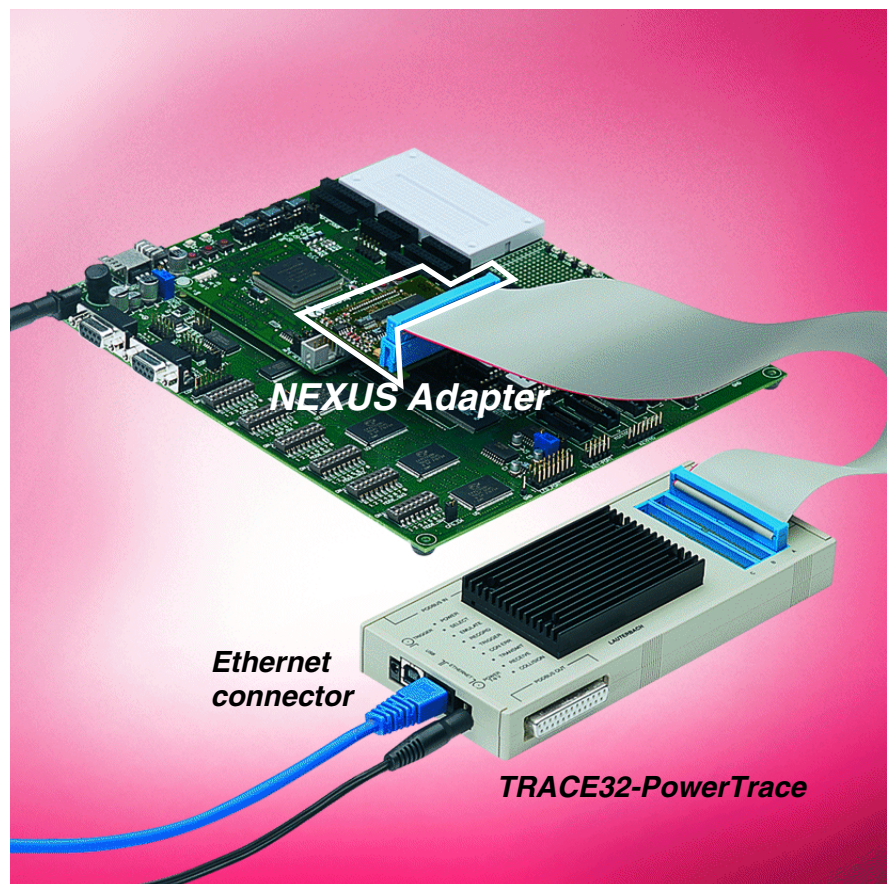
[MPC5514](#)  
[MPC5515](#)  
[MPC5516](#)  
[MPC5517](#)  
[MPC5533](#)  
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[MPC5553](#)  
[MPC5554](#)  
[MPC5561](#)  
[MPC5565](#)

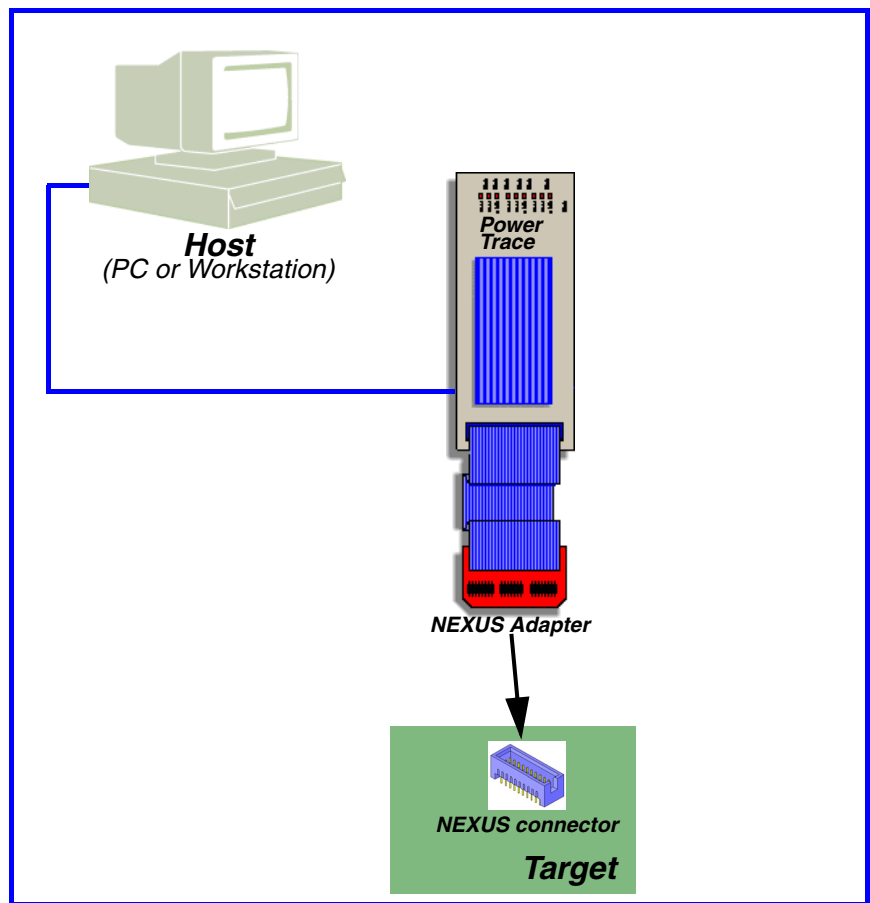
## Hardware Concept

### TRACE32-PowerTrace/NEXUS

The NEXUS support is based on the universal hardware module TRACE32-PowerTrace. The connection to the NEXUS interface on the target is done by a CPU specific NEXUS adapter.

TRACE32-PowerTrace includes a USB and Ethernet interface.



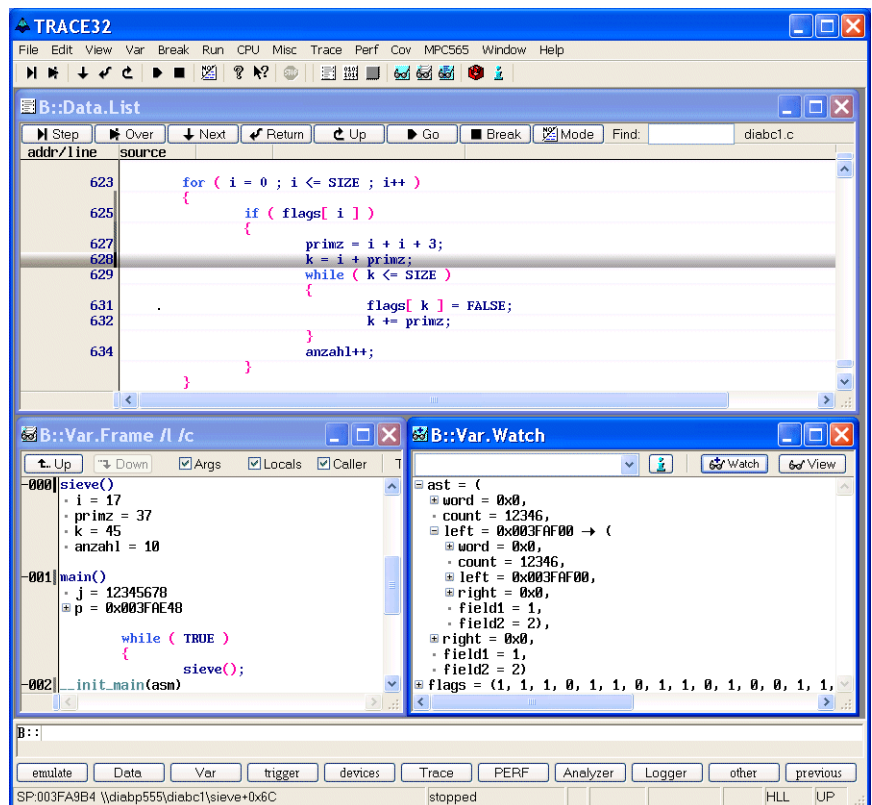
**PowerTrace**

- Universal debugger hardware for all architectures
- Ethernet or USB interface included
- Program and data flow trace for NEXUS up to 200 MHz
- 16/32 MFrame trace memory
- 96 channels
- 32 bit time stamp, 20 ns resolution

- CPU specific NEXUS Adapter

## Software Concept Debugger

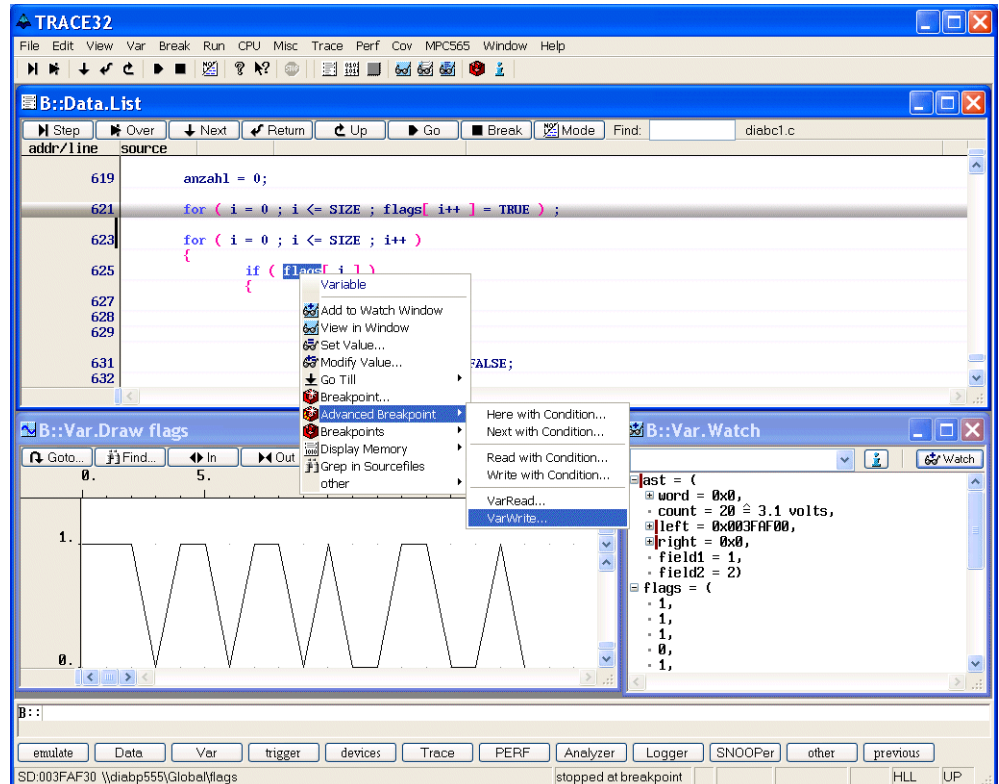
### Symbolic Debugging



A hierarchical symbol database enables structured symbolic debugging. Symbol names can be used to show single program addresses, mod-

ule names and memory classes. The disassembler can use the symbols for labels and/or operands. Demangling for C++ signatures is supported.

## High-Level Language Debugging



TRACE32 can directly load the output of all standard compilers for C, C++, JAVA, Pascal, Modula2, PEARL and ADA from most compiler vendors. Program display and debugging can be done in assembler, high-level or in a mixture of both. It is possible to con-

struct both assembler and high-level windows on the screen simultaneously. All variable types specific to the high-level language can be displayed and modified. Addresses can be absolute, relative or line number based.

### Real-time update

Real-time update of memory and variables is possible while the CPU is running.

### Debugging

The debugger uses the following breakpoint implementations to stop the program execution at a certain instruction:

- unlimited number of software breakpoints for code in RAM
- Unlimited Code Breakpoints in FLASH areas
- a limited number of onchip breakpoints for code in ROM/FLASH

The onchip breakpoints can also be used to stop the program execution after a read/write access to a specific memory address.

The number of available onchip breakpoints depends on the resources provided by the CPU used.

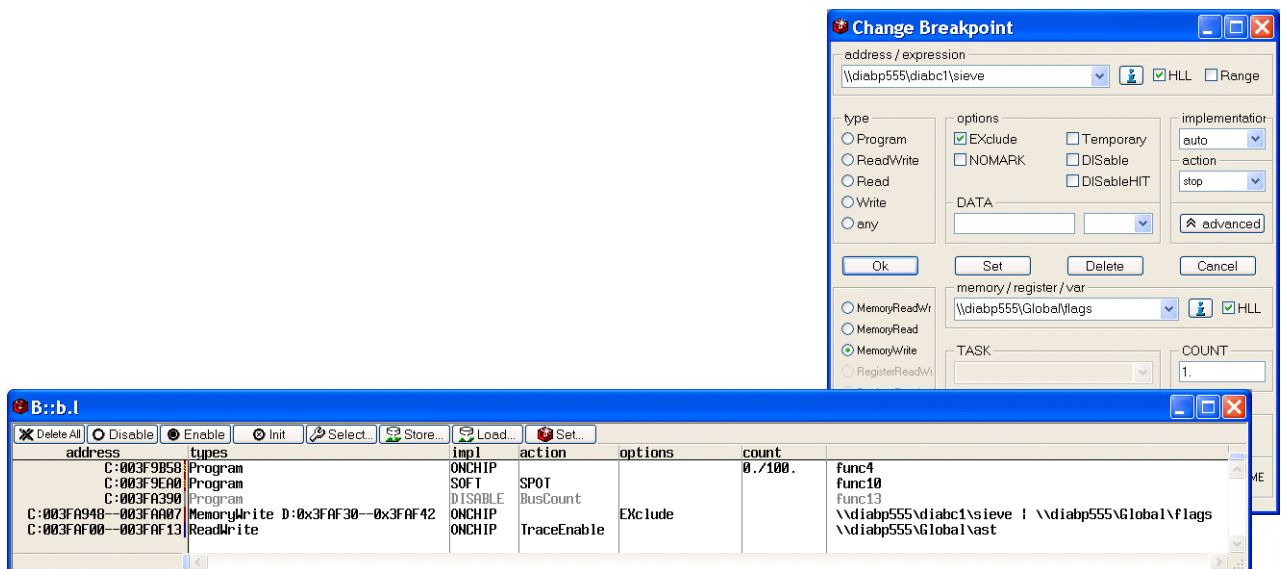
## Advanced breakpoints

The NEXUS provides also a simple way to set complex break conditions:

- Setting of breakpoints to the reading and writing of specific data values
- Linking the breakpoint with a condition

- Linking the breakpoint with commands that are executed whenever the breakpoint is reached
- Spot breakpoints on data accesses

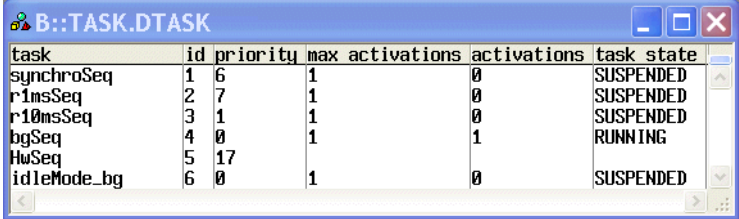
A combination of all 4 new features is also possible.




## RTOS Awareness

The NEXUS Debuggers provide display functions, closely mirroring the command set of the integral debugger of the RTOS. The system resources e.g. tasks, objects, partitions, queues,

regions and semaphores can be displayed. These functions are also available if the integral debugger is not linked to the software.

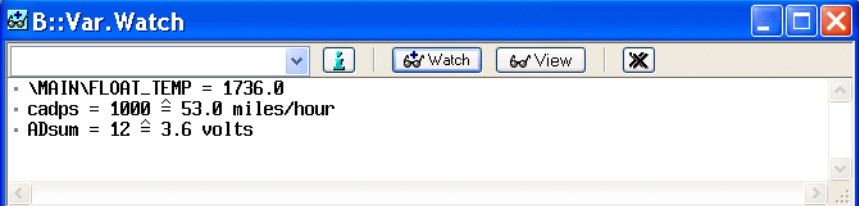


task	id	priority	max activations	activations	task state
synchroSeq	1	6	1	0	SUSPENDED
r1msSeq	2	7	1	0	SUSPENDED
r10msSeq	3	1	1	0	SUSPENDED
bgSeq	4	0	1	1	RUNNING
HwSeq	5	17			
idleMode_bg	6	0	1	0	SUSPENDED

name	low	high	sp	%	low	spare	max
ERCOSEK_STACK	003F9C10	003F9CF0			003F9C10	00000000	100%
USER_STACK	003F9E40	003FA598	003FA570	2%	003F9E40	00000000	100%

OSEK awareness with ORTI support



· \MAIN\FLOAT_TEMP = 1736.0
· cadps = 1000 $\hat{=}$ 53.0 miles/hour
· ADsum = 12 $\hat{=}$ 3.6 volts

ASAP2 based scaled variable display

## Peripherals

- Display of onchip peripherals
- User definable display of the onchip peripherals
- Definition is done interactive supported by softkeys
- Pull down menus for settings
- Additional description for each field

```

B::per
BBC
USIU
SIU System Configuration
IMPR 33110000 PARTNUM 00000033 MASKNUM 00000011 FLEN yes CLES no ISB s00000000
SIUMCR 00C04000 EARB int EARP 0 DSHW yes DBGCC BDM/full_trace DBPC bdm ATMC at
GPC pflow/1-watch DLK no SC pflow_only RCTX rstconf MLRC all_irq_pins
MTSC no NOSHOW ena ECIEEN dis LPMASK_EN dis
SVPCR |FFFFFF8B SWTC |FFFF BMT FF BME ena SWF ena SWE dis SWRI int SWP no
SMT FFFF
SMASR 0000
TESR 00000000 IEXT ok IBMT ok DEXT ok DBM ok

System Clock
SCDR 81213F00 COM cIk_full/bus_full TBS osc RTDIV /512
STBUC no CDS no PROEN hig RTSEL osc BUCS no EBDP /1 LME ena
EECLK 1/1 ENGDIV /64 DFNL /2 DFNH /1
PLPRCR 00414000 MF x5 MFPDL no LOCS no LOCSS no SPLS yes
  
```

## Flash Programming

address	type	width	state	unit
C:00000000-00003FFF	C3FLASH	byte	auto	1. (002FC800/00004000)
C:00004000-00007FFF	C3FLASH	byte	auto	2. (002FC800/0000C000)
C:00010000-0001BFFF	C3FLASH	byte	auto	3. (002FC800/0000C000)
C:0001C000-0001FFFF	C3FLASH	byte	auto	4. (002FC800/00004000)
C:00020000-00023FFF	C3FLASH	byte	auto	5. (002FC800/00010000)
C:00030000-00033FFF	C3FLASH	byte	auto	6. (002FC800/00010000)
C:00040000-00043FFF	C3FLASH	byte	auto	7. (002FC800/00010000)
C:00050000-00053FFF	C3FLASH	byte	auto	8. (002FC800/00010000)
C:00060000-00063FFF	C3FLASH	byte	auto	9. (002FC800/00010000)
C:00070000-00073FFF	C3FLASH	byte	auto	10. (002FC800/00010000)
C:00080000-00083FFF	C3FLASH	byte	auto	11. (002FC840/00010000)
C:00090000-00093FFF	C3FLASH	byte	auto	12. (002FC840/00010000)
C:000A0000-000A3FFF	C3FLASH	byte	auto	13. (002FC840/00010000)
C:000B0000-000B3FFF	C3FLASH	byte	auto	14. (002FC840/00010000)
C:000C0000-000C3FFF	C3FLASH	byte	auto	15. (002FC840/00010000)
C:000D0000-000D3FFF	C3FLASH	byte	auto	16. (002FC840/00010000)
C:000E0000-000E3FFF	C3FLASH	byte	auto	17. (002FC840/00004000)
C:000E4000-000E7FFF	C3FLASH	byte	auto	18. (002FC840/0000C000)
C:000E8000-000EBFFF	C3FLASH	byte	auto	19. (002FC840/0000C000)
C:000FC000-000FFFFF	C3FLASH	byte	auto	20. (002FC840/00004000)

The NEXUS debugger support the programming of external flash memory as well as the programming of internal flash memory of microcontrollers. The

programming can be controlled by the debugger or by a routine in the target system.



## Software Concept Trace

### Program/Data Flow Trace

TRACE32-PowerTrace for NEXUS samples all trace messages output via the NEXUS Auxiliary Output Port e.g. branch trace messages, data trace messages....

record	run	address	cycle	d.l	symbol	ti.back
		bgt	0x3FA9E4		; 0x3FA9E4 (-)	
625		{				
		if ( flags[ i ] )				
		lis	r12,0x40		; r12,64	
		subi	r12,r12,0x50D0		; r12,r12,20688	
		lbzx	r12,r12,r31		; r12,r12,i	
000000209		D:003FAF39 rd-byte			00 \diabp555\Global\flags+0x9	0.940us
		cmpwi	r12,0x0		; r12,0	
000000208		beq	0x3FA9DC		; 0x3FA9DC (-)	
		P:003FA9DC execute			\diabp555\diabc1\sieve+0x94	0.200us
		addi	r31,r31,0x1		; i,i,1	
		b	0x3FA990			
000000207		P:003FA990 execute			\diabp555\diabc1\sieve+0x48	0.360us
		cmpwi	r31,0x12		; i,i,18	
		bgt	0x3FA9E4		; 0x3FA9E4 (-)	
625		{				
		if ( flags[ i ] )				
		lis	r12,0x40		; r12,64	
		subi	r12,r12,0x50D0		; r12,r12,20688	
		lbzx	r12,r12,r31		; r12,r12,i	
000000206		D:003FAF3A rd-byte			01 \diabp555\Global\flags+0x0A	0.940us
		cmpwi	r12,0x0		; r12,0	

### Selective Tracing

record	run	address	cycle	d.l	symbol	ti.back
000000028		D:003FAE64	wr-long	0000159A	\diabp555\diabc1\mstatic1	0.700us
000000027		D:003FAE64	rd-long	0000159A	\diabp555\diabc1\mstatic1	0.840us
000000026		D:003FAE64	wr-long	00002D30	\diabp555\diabc1\mstatic1	0.700us
000000025		D:003FAE64	rd-long	00002D30	\diabp555\diabc1\mstatic1	0.860us
000000024		D:003FAE64	wr-long	00005C5C	\diabp555\diabc1\mstatic1	0.700us
000000023		D:003FAE64	rd-long	00005C5C	\diabp555\diabc1\mstatic1	0.840us
000000022		D:003FAE64	wr-long	0000A31E	\diabp555\diabc1\mstatic1	0.700us
000000021		D:003FAE64	rd-long	0000A31E	\diabp555\diabc1\mstatic1	0.860us
000000020		D:003FAE64	wr-long	00010176	\diabp555\diabc1\mstatic1	0.700us
000000019		D:003FAE3C	rd-long	00001795	\diabp555\diabc1\func2\static	0.900us
000000018		D:003FAE64	rd-long	00010176	\diabp555\diabc1\mstatic1	0.340us

TRACE32-PowerTrace/NEXUS supports selective tracing on 2 data address ranges. Selective tracing is supported on:

- Specified data accesses only

- Specified data accesses plus the complete program flow information

## CTS Context Tracking System and SmartTrace

```

record
550      func2d();
-0000000749
-0000000748      func2d                                     diabc1.c\203      0.160us
205      void func2d()
-0000000748      {
      autovar = 13
      regvar = 7
      mstatic1 = 785400
      auto short autovar; /* short stack variable */
      register short regvar; /* short register variable */

      autovar = regvar = mstatic1;
      autovar = -1032
      regvar = -1032
      autovar = -1032
      autovar++;
      autovar = -1031
      regvar = -1032
      for ( regvar = 0; regvar < 51 ; regvar++ )
      regvar = 0
      vlong = 8636710

```

- Reconstructs registers and memory from trace
- SmartTrace fills trace gaps caused by buffer overflow

## Statistic functions

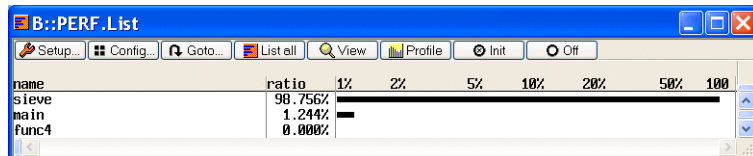
The very large trace buffer allows function runtime analysis over a long period.

tree	time	min	max	avr	count	ratio	1%	2%
(root)	317.900us	0.000	317.900us	317.900us	1. (-2)	0.000%		
└─ main	317.900us	0.000	317.900us	317.900us	1. (-1)	6.739%		
└─┬─ func2	20.760us	20.760us	20.760us	20.760us	1.	4.138%		
└─┬─┬─ func1	7.600us	2.440us	2.600us	2.530us	3.	2.398%		
└─┬─┬─┬─ func2a	9.960us	9.960us	9.960us	9.960us	1.	3.132%		
└─┬─┬─┬─┬─ func2b	9.600us	9.600us	9.600us	9.600us	1.	3.019%		
└─┬─┬─┬─┬─┬─ func2d	12.000us	12.000us	12.000us	12.000us	1.	3.773%		
└─┬─┬─┬─┬─┬─┬─ func4	7.700us	7.700us	7.700us	7.700us	1.	2.421%		
└─┬─┬─┬─┬─┬─┬─┬─ func3	1.100us	1.100us	1.100us	1.100us	1.	0.345%		
└─┬─┬─┬─┬─┬─┬─┬─┬─ func5	3.140us	3.140us	3.140us	3.140us	1.	0.987%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func8	18.860us	18.860us	18.860us	18.860us	1.	5.931%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func9	17.800us	17.800us	17.800us	17.800us	1.	2.408%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func1	10.140us	2.460us	2.640us	2.535us	4.	3.188%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func10	144.960us	144.960us	144.960us	144.960us	1.	45.587%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func11	0.000	0.000	0.000	0.000	1.	0.000%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func13	21.240us	21.240us	21.240us	21.240us	1.	1.333%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func13	17.000us	17.000us	17.000us	17.000us	1.	1.824%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func13	11.200us	11.200us	11.200us	11.200us	1.	1.805%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func13	5.460us	5.460us	5.460us	5.460us	1.	1.717%		
└─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─┬─ func14	1.760us	1.760us	1.760us	1.760us	1.	0.553%		

## Trace-based Performance Analysis

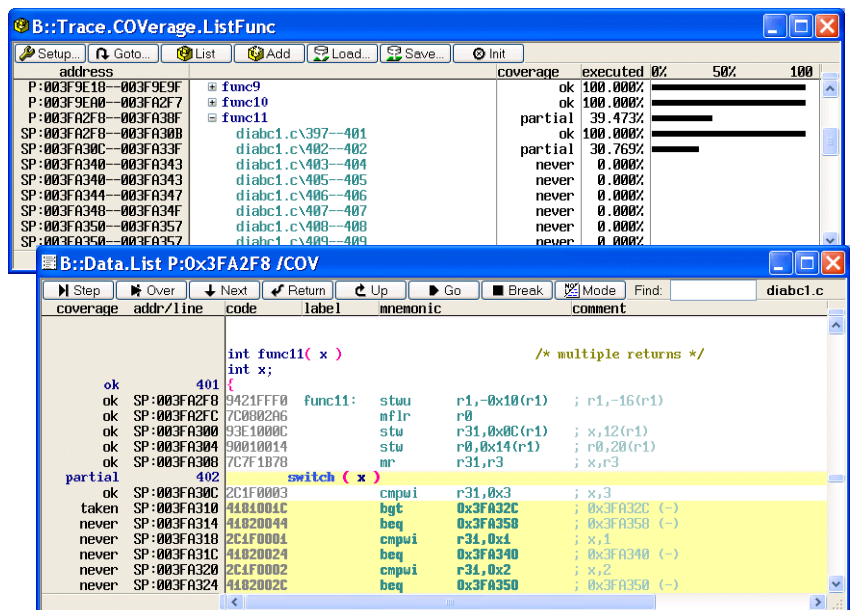
The performance measurement used by TRACE32-PowerTrace/NEXUS is a statistical process. To determine for example which function or which module uses the greatest proportion of the total runtime the recording into the

trace memory is stopped briefly to determine the current program counter contents. This measurement has absolutely no influence on the real-time behaviour.



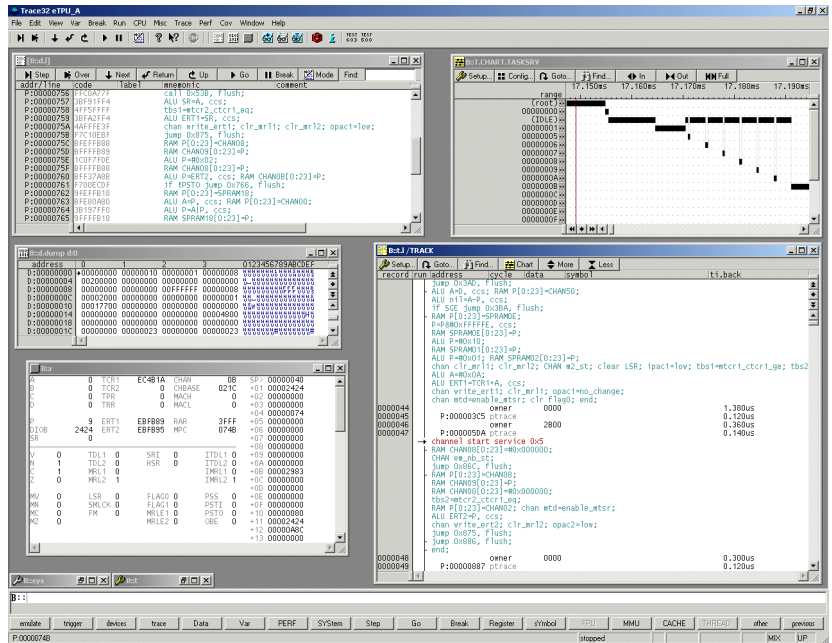
## Code Coverage

It is also possible to perform a code coverage analysis based on the comprehensive information from the trace memory.



## eTPU Support

- Full-featured Debugger and Trace
- Source and HLL debugging
- Support for all Onchip breakpoints
- View of all eTPU registers
- Debugging of all eTPUs and PPC synchronously
- CTS (Context Tracking System)



## Code Compression

- Will be supported for future MPC5xx devices

## Standby Mode

Standby mode and debugging thru power-down cycle is supported.

## CTU (Complex Trigger Unit)

- Selective data trace
- Markers
- Trace control
- Counters
- 4 trigger levels
- Trigger inputs and outputs

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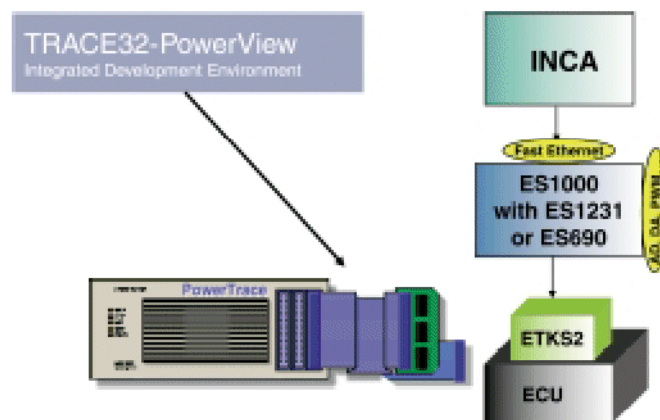
## Trace

 4 bit mode 12 bit mode

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## ETK Support

The NEXUS for PowerPC can work with ETAS ETK



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## DSPACE Support

Fast prototyping and debugging simultaneously.

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## Supported Processors

tbd

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## Operation Voltage and Frequency

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### Operation Voltage

This list contains information on probes available for other voltage ranges.

Probes not noted here supply an operation voltage range from 4.5V to 5.5V. tbd

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### Frequency Trace

The maximum operation frequency of TRACE32-RISC Trace or PowerTrace depends on:

- The max. frequency of the CPU
- The number of waitstates (bus trace)

- The divide factor between trace clock and core clock
- The speed of the trace adapter

## Dimensions and Adapters

### Connector (MICTOR)

Signal	Pin	Pin	Signal
MDO12	1	2	MDO13
MDO14	3	4	MDO15
MDO09	5	6	(CLKOUT)
N/C	7	8	MDO08
RSTIN-	9	10	EVTI-
TDO	11	12	VTREF
MDO10	13	14	RDY-
TCK	15	16	MDO07
TMS	17	18	MDO06
TDI	19	20	MDO05
JCOMP	21	22	MDO04
MDO11	23	24	MDO03
RESETOUT	25	26	MDO02
TDET/WTDIS	27	28	MDO01
BGRNT	29	30	MDO00
N/C	31	32	EVTO-
N/C	33	34	MCKO
BREQ	35	36	MSEO1-
N/C	37	38	MSEO0-



## Connector (Glenair)

Pin	Signal
1	N/C
2	N/C
3	N/C
4	ARBREQ(TOOLIO0)
5	TDO
6	RDY-
7	RSTIN-
8	VREF
9	EVTI-
10	GND
11	TRST-
12	GND
13	TMS
14	GND
15	TDI
16	GND
17	TCK
18	GND
19	MDO0
20	GND
21	MCKO
22	GND
23	EVTO-
24	GND
25	MSE00-
26	MDO9
27	MDO1
28	GND
29	MDO2
30	GND
31	MDO3
32	GND
33	ARBGRT(TOOLIO1)
34	GND
35	MSE01-
36	GND
37	MDO4
38	GND
39	MDO5
40	GND
41	MDO6
42	GND
43	MDO7
44	GND
45	MDO8
46	GND
47	MDO10
48	GND
49	MDO11
50	GND (TDET)
51	RSTOUT(VENIO2)

### Connector (SAMTEC 50)

Signal	Pin	Pin	Signal
MSEO0-	1	2	VREF
MSEO1-	3	4	TCK
GND	5	6	TMS
MDO00	7	8	TDI
MDO01	9	10	TDO
GND	11	12	TRST- (JCOMP)
MDO02	13	14	DBGACK- (RDY)
MDO03	15	16	EVTI-
GND	17	18	EVTO-
MCKO	19	20	RSTIN-
MDO04	21	22	RSTOUT
GND	23	24	GND
MDO05	25	26	CLKOUT
MDO06	27	28	TD/WDTE
GND	29	30	GND
MDO07	31	32	DAI1
MDO08	33	34	DAI2
GND	35	36	GND
MDO09	37	38	ARBREQ
MDO10	39	40	ARBGR7
GND	41	42	GND
MDO11	43	44	MDO13
MDO12	45	46	MDO14
GND	47	48	GND
MDO15	49	50	N/C

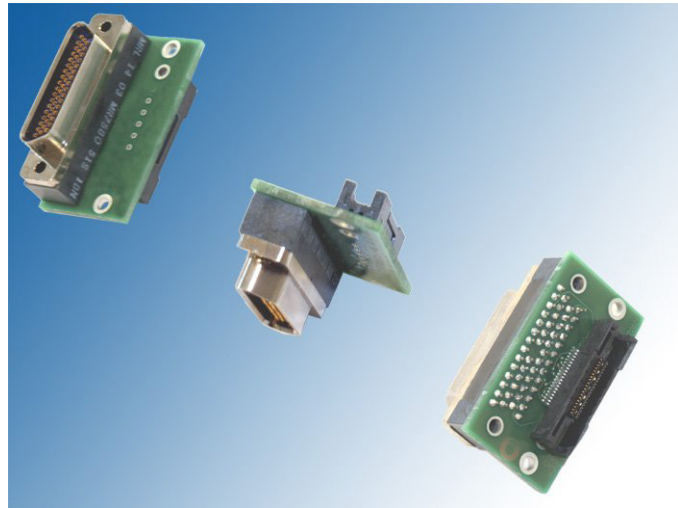
Table 1:

### Connector (SAMTEC 20)

Signal	Pin	Pin	Signal
MSEO0-	1	2	VREF
MSEO1-	3	4	TCK
GND	5	6	TMS
MDO00	7	8	TDI
MDO01	9	10	TDO
GND	11	12	TRST- (JCOMP)
MDO02	13	14	DBGACK- (RDY)
MDO03	15	16	EVTI-
GND	17	18	EVTO-
MCKO	19	20	RSTIN-

Table 2:

Modules and Adapters



tbd

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## Order Information

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### Module Description

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### Detailed Order Information

## Contact

### International Representative

#### Argentina

Anacom Eletronica Ltda.  
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